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STRENGTHENING CAPACITIES IN DEVELOPING COUNTRIES TO DEVELOP THEIR ENVIRONMENTAL SERVICES SECTOR

Background note by the UNCTAD secretariat

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INTRODUCTION

1. The environmental problems which developing countries face are enormous and put in jeopardy the ecological equilibrium not only of those countries but of the entire ecosystem. One half of the world population lacks adequate sanitation and one person out of five worldwide has no access to safe drinking water: most of the people living in these conditions are in the developing world. Air pollution, such as last year's smog across South-East Asia, causes premature deaths and chronic illnesses, which have a strong negative impact on the human and economic resources of the countries affected. As a result of the increase in transnational trade, travel and migration, environmental problems which originate in developing countries do not remain confined to the boundaries of these countries. These problems need to be solved as a matter of urgency and as a precondition for ensuring sustainable development.

2. Awareness of the importance of environmental problems has led a growing number of countries, particularly in the industrialized world, to introduce environmental legislation and taxation, and, more generally, has brought about the incorporation of the environmental dimension into overall economic and financial policy. Such action has had a noticeable impact on the expansion of the market for environmental and environment-friendly goods and services. While the environmental industry experienced dramatic growth in industrialized countries during the 1980s and the beginning of the 1990s, reaching US$ 452 billion in revenues in 1996, it now seems to face stagnation in demand. Firms in countries which are members of the Organization for Economic Co-operation and Development (OECD) may therefore be looking to emerging countries for new business opportunities.

3. Trade in environmental services appears to be relatively free of restrictions in comparison with other service sectors. The concern of exporters of such services would seem to be with the need to achieve greater market access in terms of commercial presence. Unlike in many other service sectors, exports of environmental services involve considerable investment in the importing country and thus ownership and control become a significant consideration. The movement of natural persons is also a relevant factor. Thus, additional commitments in the framework of the General Agreement on Trade in Services (GATS) could offer new market opportunities to firms from developed countries and provide developing countries with greater access to such services, to the benefit of the environment, the people and their own developing environmental services industry.

4. As in other service sectors, trade in environmental services may be affected by lack of market access in other sectors. Engineering, consulting and analytical services are almost invariably in the vanguard of the provision of environmental services. Liberalization would therefore include several sectors in a single package, where both developing and developed countries could find a trade interest. However, the benefits of such liberalization, both in terms of the trade interests of the exporter and the objectives of the importing country related to environmental protection and building domestic capacity, may not be realized if certain preconditions are not satisfied. In

particular, appropriate domestic environmental legislation has to be developed and enforced and economic incentives have to be set up to generate a sustainable demand for environmental goods and services.

5. The lesson that can be learnt from the experience of developed countries is that a mixture of command-and-control and economic instruments is perhaps the appropriate way to deal with environmental problems and to ensure, at the same time, that compliance with regulations is not decoupled from economic benefits. Incentives to reduce pollution and to introduce technical innovation (the so-called "dynamic efficiency") may be worth introducing, as well as flexibility in the ways and means to comply with environmental requirements. However, the effects of environmental policy instruments on prices, employment, trade and competitiveness should be carefully assessed. Their political acceptability depends on many factors, such as cost, simplicity, transparency and public participation.

6. A situation conducive to the transfer of environmentally sound technologies (ESTs) needs to be established, and domestic firms need to develop the skill to absorb ESTs and adapt them to local needs. Forging partnerships between firms in developing and developed countries is proving to be a viable tool for helping firms from developing countries to acquire state-of-the-art technologies, reach markets that otherwise would be difficult to access, and become part of an international network. For firms from developing countries, such partnerships facilitate their activities in emerging markets, where environmental and business conditions can be quite different from those at home. Partnerships seem to have dramatically contributed to enhancing technological capabilities in developing countries.

7. A gap exists in developing countries between their environmental needs and the resources available to satisfy them. International cooperation and financing are key factors in enabling developing countries to address their most pressing environmental problems. Education and information can encourage public authorities, producers and consumers to adopt more sustainable approaches. Political willingness and leadership play a crucial role in making it possible to devote efforts and resources to environmental improvements. Governments, especially in developing countries where resources are limited and several key environmental needs have still to be satisfied, have an interest in ensuring that environmental policy decisions are the result of a participatory process.

8. Strengthening capacities in the environmental services sector in developing countries, while primarily aimed at addressing and eventually solving environmental problems, may also result in their ability to become international providers in this field. It can also help them to increase their capacities to meet environmental requirements in the importing markets, become more appealing destinations for foreign direct investments, have easier access to capital and strengthen other domestic sectors, such as tourism.

9. Some developing countries have proved able to build up a solid environmental services sector which has helped them in dealing with

environmental problems. As a by-product, they have also been able to export their services abroad. In these successful cases, several elements have played a role, namely, political willingness and leadership, appropriate environmental legislation and enforcement, financial resources made available by international agencies, technical assistance provided by developed countries, cooperation between the Government and the private sector, and a participative decision-making process.

10. The environmental services sector presents equity problems similar to those faced in the health services sector. In the environmental sector, as in the health sector, ultimately all considerations point to the need for Governments to provide a strong and effective regulatory and incentive framework for the private actors involved in providing environmental services. An appropriate framework reinforces both equity and efficiency. Developing countries may therefore wish to set conditions under which domestic and foreign private companies are to operate, possibly in the form of qualifications to market-access commitments under GATS. These qualifications could focus on measures to ensure equity (e.g. maximum prices for consumers, percentage of profits that should be reinvested in the infrastructure) or capacity-building (e.g. technology transfer, training of personnel, minimum local content), in conformity with articles IV and XIX of GATS.

11. This note has been prepared with a view to assisting the Expert Meeting in its deliberations. It addresses the following broad issues: the environmental industry; the demand-generating factors in the environmental goods and services market; GATS commitments; developing countries' business opportunities and constraints in the sector; and capacity-building issues. The Expert Meeting may wish to address the following questions that flow from the analysis by the secretariat:

(i) What type of legislation and policy mix - in terms of command-and-control versus economic instruments - is the most efficient one for expanding the market for environmental services?

(ii) What type of measures should be adopted internationally so as to facilitate international trade in environmental services that are or can be provided by developing countries?

(iii) Would the liberalization of the environmental market in itself provide developed countries with new business opportunities and developing countries with easier access to the much-needed environmental goods, services and expertise?

(iv) What specific measures can be adopted so as to enable domestic firms in developing countries to absorb and eventually produce environmentally sound technologies?

(v) What type of assistance should developing countries, and in particular the least developed countries (LDCs), receive from the international community so as to overcome their resource limitations in securing environmental services?

(vi) How can the environmental dimension be best incorporated in the education programmes of developing countries so as to allow for the sensitivities of public opinion?

(vii) How can the equity problems related to the supply of environmental services best be addressed? If private companies replace public authorities in discharging public functions, such as managing the water supply, would the principle of equal utilization of natural resources by all population groups be ensured? Would market rules applied to public services help to improve living conditions for the poorest members of the population, especially in developing countries, or would they exacerbate the differences between those who can pay for satisfactory basic environmental needs and those who cannot?

I. THE MARKET

A. The environmental industry

12. Environmental services are one segment of the environmental industry. The environmental industry is a fairly new sector, and it presents problems of definition and quantification. According to the OECD which has taken the lead at the intergovernmental level in defining and classifying the industry, "the environmental industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. These include cleaner technologies, products and services which reduce environmental risk and minimise pollution and resource use, although there is currently no agreed methodology which allows their contribution to be measured in a satisfactory way." 1/ The industry is going through important changes from a structural point of view (e.g. privatization, consolidation), from the kind of outputs it provides (e.g. from end-of-pipe to cleaner technology), and from the goals it aims at (e.g. from compliance with environmental regulations to resource productivity).

13. More specifically, the environmental industry includes equipment (such as equipment for water supply and delivery, treatment of waste-water, waste-handling, air-pollution control, laboratory testing and prevention), services (such as engineering design, construction and management of utilities, waste collection and processing, legal and consulting services, remediation services and strategic environmental management) and resources (such as the sale of water, recovered materials and renewable energy).

14. The main purchasers of environmental goods and services have traditionally been (i) local authorities, which buy products such as equipment or laboratory services to discharge their tasks, (ii) federal Governments, which hire environmental service providers for institution-building and to help them carry out their environmental initiatives, and (iii) several manufacturing sectors, which buy goods and services from other firms to comply with environmental requirements or to improve their environmental performance. The public sector devotes the largest share of its environmental expenditures

to water and effluent treatment, waste-handling and recycling, and cleaning up contaminated sites, while the private sector invests mainly in air-pollution control and waste treatment. In the OECD countries, total environmental expenditure is evenly divided between the public and private sectors, while in developing countries the public sector accounts for around 70 per cent of overall environmental expenditure. The public sector is also a large provider of environmental goods and services, providing the infrastructure for drinking water, waste-water treatment, waste management and decontamination, resource management and silviculture. However, things are changing: because of privatization in both developed and developing countries in the water, energy and waste sectors, private companies are replacing public authorities in the delivery of environmental services. On the other hand, some public-sector bodies which have developed an expertise in the environmental services area are making it available to other countries, and are therefore competing with private firms in the market.

15. According to an estimate from the private sector, in 1996 the global environmental market represented some US$ 452 billion in revenues generated by private companies and public-sector bodies. 2/ Half of the market was represented by fees generated by services, while the remaining half was almost equally divided between equipment sales and the sale of environmental resources such as water, energy or reclaimed material. Around 87 per cent of total revenue was generated in the United States of America, Western Europe and Japan, with shares of 38 per cent, 29.5 per cent and 19.3 per cent, respectively; Asia generated 4.2 per cent of revenue, Latin America 1.9 per cent, countries in the Middle East 1 per cent and Africa 0.5 per cent. The leaders in the regional markets are Germany, France and the United Kingdom in Europe, the Republic of Korea, Taiwan Province of China and China in Asia (excluding Japan), and Brazil, Mexico and Argentina in Latin America. The annual growth forecast (for 1998-2000) is rather limited for the United States (1.8 per cent), Western Europe (2.8 per cent) and Japan (2.6 per cent), but is promising for Asia and Latin America (12 per cent), Africa (10 per cent) and countries in the Middle East and Eastern Europe (8 per cent). Global annual growth is estimated at 3 per cent. Therefore, the environmental industry market might well reach US$ 514 billion by the year 2000. 3/

16. Traditionally, the environmental industry has not been very export-oriented. This is because for a long time local demand has provided enough business; small and medium-sized companies - which account for half of the market - have little inclination and limited capacity to export; and specific expertise linked to local environmental problems and conditions is often required. In the United States, only 9 per cent of industry revenues are generated from overseas business. Germany and Japan export around 20 per cent of their environmental industry capacity; Austria, Canada, the Netherlands, Sweden and Switzerland export between 15 and 20 per cent; and Australia, France and the United Kingdom export between 10 and 15 per cent. 4/ However, the trend towards harmonizing national environmental standards, adopting global environmental targets (especially through the implementation of multilateral environmental agreements) and privatizing utilities may make the industry more trade-oriented.

17. The environmental industry has a dual structure, with a small number of large firms accounting for about 50 per cent of output in individual market segments and a large number of smaller firms accounting for the remainder. In 1995, the top 50 companies in the industry represented 20 per cent of the market, with American and French firms taking the lead. The only company from a developing country which appears in the list is a Brazilian State-owned company operating in the sector of water supply and waste-water treatment.

18. In most industrialized countries, and especially in the United States, the environmental industry is now showing the characteristics of a maturing industry: decelerating growth, intense competition, increasing consumer sophistication, pricing pressure, consolidation of market share by larger players, reduced profitability and strong merger-and-acquisition activity. In these countries the period of rapid growth - which was mostly related to the implementation and the enforcement of environmental legislation - seems to be over. In the United States, annual growth in the sector, that ranged between 10 and 15 per cent in 1985-1990, declined to between 1 and 5 per cent between 1991 and 1996; in Western Europe and Japan annual growth that ranged between 6 and 12 per cent between 1980 and 1990 declined to between 0 and 5 per cent between 1991 and 1996. 5/ The high degree of compliance with existing legislation by the major industrial sectors, fewer new regulations and less stringent enforcement may have made the demand for environmental goods and services stagnate. 6/ Some firms from developed countries providing environmental goods and services are therefore looking for new market opportunities.

19. The most rapid market growth may occur in developing countries, where booming population, fast-paced urbanization and flourishing industrialization create an enormous need for environmental goods and services: developing countries are in a "catch-up" mode and are addressing the most pressing pollution problems, much as the developed world did in past decades. However, scarce financial resources and competing needs, the absence of environmental regulations and lack of enforcement instruments, and limited awareness of the risks associated with environmental problems limit the potential demand in those countries.

Box 1

Environmentally sound technologies

There are no commonly accepted definitions of environmentally sound technologies (ESTs), although they do share some generally recognized features - such as the fact that they are introduced in a highly regulated framework, they represent a response to urgent global environmental problems and they may benefit from public funding for research and development - and it is increasingly recognized that these features distinguish them from other technologies. It should be noted, however, that because of the evolving nature of environmental problems, what might be perceived as environmentally sound today may not necessarily be seen in the same way tomorrow. Moreover, a technology perceived as environmentally sound in one country may not be seen in the same way in another. However, for the purposes of clarity, ESTs may be considered to refer to "clean" technologies which have little impact on the environment in terms of pollution or which are high in energy efficiency compared to other technologies currently in use. They are often categorized as "end-of-pipe" and "cleaner" technologies. "End-of-pipe" technologies concentrate on removing pollutants from waste streams; they include filters, waste incinerators, dumpers, composters, and dust and grease interceptors. Cleaner technologies are those which optimize the existing process of production by ensuring the correct measure of inputs and the reduction of pollution during and after the economic activity, as well as those which require more drastic changes in the production process and product composition, and thus avoid pollution from the beginning of the production process. Some examples of cleaner technologies are procedures that clean raw materials before they are used, processes which reduce the creation of hazardous wastes during production, and the use of substitutes for chlorofluorocarbons (CFCs).

Source: UNCTAD in cooperation with the United Nations Environment Programme (UNEP) and the Department of Economic and Social Affairs (DESA), "The role of publicly funded research and publicly owned technologies in the transfer and diffusion of environmentally sound technologies", background document for the International Expert Meeting on the role of publicly funded research and publicly owned technologies in the transfer and diffusion of environmentally sound technologies, Kyongju, Republic of Korea, 4-6 February 1998; and C. Almeida, "Development and transfer of environmentally sound technologies in manufacturing: a survey", UNCTAD Discussion Papers, No. 58, April 1993.

20. In Latin America expanding population and urbanization mean there is a need to find solutions to serious air, water and waste problems. Therefore, the market has seen infrastructure-related projects, primarily in sewage treatment and water delivery, as the main drivers. In particular, the market for water and waste-water treatment is expanding rapidly. British and French water companies, thanks to a comparative advantage gained mostly as a result

of accelerated privatization, have been able to take advantage of the demand and are providing integrated, system-wide solutions. The control of air pollution, from both stationary and mobile sources, has recently become an item on the regional environmental agenda, but legislation and enforcement are still lacking. However, the demand for environmental goods and services varies considerably across countries and within countries.

21. In South-East Asia, most countries have implemented legislation related to air, land and water protection and have set up environmental authorities. Region-wide standards and regulations, particularly on hazardous waste and vehicle emissions, are being developed. Malaysia is in the process of privatizing the sewerage system of the entire country, while Indonesia, Thailand and the Philippines have started build-operate-transfer schemes in public utilities and public/private collaborations open to foreign participation. Some leading industries, such as the electronics industry, have already made the switch from end-of-pipe to cleaner technology, but fast-paced development and the concentration of industries in specific areas still create enormous environmental problems. Before the recent financial crisis, the South-East Asian market was regarded as the world's fastest growing environmental market. In the Republic of Korea, the environmental market is mainly related to air-pollution control and waste management as a result of the implementation of strict legislation on air emissions and of a new waste policy which encourages incineration rather than landfill and aims at increasing recycling.

22. In China, the regulatory structure for environmental protection is probably more extensive and developed than in most other developing countries. However, environmental authorities do not have the resources to enforce regulatory policies throughout the country. Multilateral and bilateral assistance seems to be driving market growth at present, much as in the rest of the developing world, although provincial and municipal governments are emerging as legitimate customers for environmental service providers. The spending programme implemented by the Government on outside lending focuses on building and upgrading disposal and sewerage facilities in major cities, as well as water supply and treatment systems.

23. In Africa, rapid population growth and urbanization are making drinking water supply, solid waste disposal and waste-water treatment the main concerns. The African Development Bank has estimated that 73 per cent of the market is represented by water supply and sewerage, 23 per cent by waste management equipment, and 13 per cent by pollution control equipment. 7/

B. The segments of environmental services

24. The environmental services sector is difficult to identify as a coherent sector. The public infrastructure services of drinking water, waste-water treatment and waste management are the core and most traditional environmental services, while services related to compliance with environmental legislation and remediation have developed in a subsequent phase. "Next-generation" environmental services are those aimed at helping companies to reduce pollution as part of the process of pursuing resource efficiency, high productivity and increased competitiveness not solely driven by regulations. 8/

25. For the purpose of this study, environmental services are divided into four segments: (i) environmental infrastructure services; (ii) air-pollution control services; (iii) remediation services; and (iv) support services. 9/

26. Environmental infrastructure services include services mainly related to water and waste management. More specifically, they include: the engineering design of equipment for the delivery and treatment of drinking water; the design of equipment for handling, storing and transporting solid, liquid or hazardous waste; the design, management and operation of waste-water treatment plants; the management and maintenance of drinking-water systems; the collection, treatment and disposal of solid waste; and waste recovery and recycling. In the OECD countries, environmental infrastructure services are mainly provided by municipalities and large firms or transnational corporations with a longstanding presence in the market. Traditional firms are expanding and taking advantage of privatization, mainly through acquisitions. In developed countries, the infrastructure for both water and waste is generally adequate, so this segment is experiencing only limited growth, mainly related to periodical improvements. However, water utilities in Europe estimate they will need to invest around US$ 152 billion by 2005 to comply with EU regulations on sewage treatment. 10/ On the other hand, this segment may well expand rapidly in developing countries, since it is a high priority for most of them.

27. Air-pollution control services consist of engineering design, installation and operations management of pollution control and abatement equipment and systems at stationary and mobile pollution sources, usually addressed in industries according to the intensity of their energy use, with power utilities in the forefront, followed by producers of primary metals and heavy industry. United States companies used to be the most competitive providers in this segment of the industry, mainly because the first comprehensive air quality legislation was passed in the United States (Clean Air Act, 1970). However, countries in Western Europe and Japan subsequently introduced air control-related regulations which are stricter than those in the United States, and are now the international leaders. The need to comply with the requirements of multilateral environmental agreements (the United Nations Framework Convention on Climate Change and the Montreal Protocol on Substances that Deplete the Ozone Layer) aimed at reducing, stabilizing or substituting gas emissions which pollute the air or damage the atmosphere, has created demand for air-pollution control technology in both developing and developed countries. Large companies are active in the market, sometimes as subsidiaries of companies operating in other segments of the industry or in the power sector.

28. Remediation services include site clean-up activities, emergency response to specific accidents, and remediation assessment and design. Remediation services are usually provided by medium-sized specialized firms or by large firms which also operate in other segments of the market. The demand for land remediation activities has been fairly strong in the United States because of strict legislation and enforcement (especially through the Superfund Amendments and Reauthorization Act of 1986), but it has never been consistent in Europe and is almost non-existent in developing countries. However, the demand for remediation services is declining in the United States because of the relaxation of legislation and less strict enforcement. 11/

Demand could rise in the long run in developing countries, especially to raise the economic value of areas which are at present contaminated, or as land scarcity and development needs turn attention to contaminated properties as opposed to the continued exploitation of undeveloped properties.

29. Support services include analytical services such as environmental laboratory testing or on-site analytical and monitoring services, legal services, consulting services, auditing, research and development, and strategic environmental management. Consulting and engineering services also support local and federal governments with environmental institution-building, monitoring, compliance assurance and enforcement. These services are typically provided by small or medium-sized companies. This segment seems to be experiencing a decline in developed countries. The main goal of support services is to help companies to comply with environmental legislation. However, considering that most major industrial groups in developed countries comply with the rules and that only limited new legislation is being implemented, the need for this kind of services seems to be shrinking. New openings will come from the implementation of voluntary instruments, such as environmental management systems (e.g. ISO 14001) or eco-labelling programmes. However, it is unlikely that these openings will compensate for the loss of business opportunities related to environmental regulatory compliance, even though some evidence suggests that the use of environmental management systems is spreading in developed and developing countries. Litigation appears to be declining in industrialized countries, since existing legislation has already been interpreted and implemented. On the other hand, this segment might well grow rapidly in developing countries, where there is an increasing need for feasibility studies on infrastructure development, capacity-building for drawing up environmental legislation and for setting up appropriate environmental authorities, environmental impact assessment (also environmental impact assessment related to the international financing of environmental projects), and environmental due-diligence related to multinational acquisitions.

30. The delivery of services is frequently accompanied by the delivery of goods: goods and services form an integrated package to address a particular environmental problem, with services often playing the leading role.

II. DEMAND-GENERATING FACTORS IN THE ENVIRONMENTAL SERVICES MARKET AND GATS COMMITMENTS IN THE SECTOR

A. Demand-generating factors

31. Four main drivers may be identified: (i) regulations and market-based instruments; (ii) education, information and public pressure; (iii) economic and financial considerations; and (iv) tax policy.

1. Regulations and market-based instruments

32. The implementation and enforcement of environmental legislation has been the traditional driver of the environmental services market. The link between environmental legislation and the demand for environmental services is very close. For example, the Japanese air-pollution control industry expanded rapidly in the 1970s and early 1980s as a result of increased domestic demand

following specific legislation in this area. German expertise in water and effluent treatment equipment derives in large part from early and stringent national legislation relating to water-pollution control. In the Netherlands, the effort to overcome land contamination problems has led to the development of advanced soil-remediation technologies. In the United States, legislation relating to site clean-up and toxic wastes greatly contributed to the country's international leadership in hazardous and waste management technologies. 12/ When firms develop expertise in a specific field in response to domestic legislation, they have the opportunity to become internationally competitive in that field.

33. Command-and-control instruments have been relied on in the first phase of countries' efforts to deal with environmental problems and, in general terms, have led to a noticeable improvement of the environment. Environmental expenditures have focused on minimizing the negative consequences of pollution, waste accumulation or contamination rather than on preventing them. As a consequence, compliance with environmental regulations has often been associated with costs and decoupled from benefits.

34. Rules related to investments in infrastructure are a particularly powerful driver of demand for environmental goods and services. For both foreign and domestic investors it is crucial to know the environmental rules they have to comply with and the liability they have to face. In developing countries, it seems that investments are the main driver of demand for environmental services at present.

35. Environmental improvements can also be achieved through the introduction of economic instruments. Economic instruments - such as environmental charges and taxes, tradeable permits, emission fees and tradeable emissions allowances, and environmental subsidies 13/ - are generally used in addition to regulatory instruments. They complement regulations by providing incentives for pollution abatement and/or a source of revenue for financing environmental services. The lesson in environmental policy development from several developed nations is that, while the regulatory approach seems adequate in the first phase of dealing with environmental problems, economic instruments appear to be more effective in the second phase, when the objective is to raise environmental performance beyond compliance and to stimulate continuous environmental improvement. Experimentation with economic instruments is quite widespread 14/ and their use is being reinforced in several countries, through the introduction of new instruments and by making the existing ones more effective and capable of inducing real changes in polluters' behaviour. 15/ Economic instruments, however, have not yet been institutionalized as major market drivers, and their full effect on companies' behaviour and on environmental quality has yet to be realized.

36. Developing countries do not constitute a homogeneous group: while most of them are still in the first phase of addressing environmental problems - and therefore the command-and-control approach seems adequate, creating a demand for a broad spectrum of environmental services - others are already introducing market instruments to complement regulations. This generates an additional and differentiated demand for the products of the environmental

industry. The need to comply with environment-related requirements in the importing markets is also stimulating demand for environmental goods and services in the manufacturing industries of developing countries.

37. The expansion of demand from the public sector is hindered by budgetary constraints: insufficient public funds are available to meet the needs for environmental infrastructure building/upgrading and clean-up in developed and developing countries. Another driver of demand in the public sector has traditionally been the implementation of large construction projects, such as roads, bridges or hydroelectric power stations. However, public funds for these purposes seem to be shrinking in both developing and developed countries. Lack of awareness by public authorities, especially in developing countries, of the risks and costs related to environmental problems represent an additional obstacle to the expansion of demand in the public sector.

Box 2

The US Administration's Partnership for a New Generation of Vehicles

An interesting experiment on the use of a mixture of command-and-control and economic instruments is taking place in the automobile sector in the United States. In 1993, Vice-President Al Gore supported the Administration's Partnership for a New Generation of Vehicles, with a 10-year goal of tripling fuel efficiency. The Partnership got off to a difficult start, since the Administration proposed to almost double the Corporate Average Fuel Efficiency (CAFE) standards by the year 2000, while the "Big Three" auto-makers wanted to exchange a research commitment for a freezing of CAFE standards. In the end, the Administration committed more than a billion dollars to the Partnership over a decade, through some 20 federal laboratories, and the car producers committed hundreds of millions more to meet the ambitious goal of developing a totally new technology. Government financing of this "pre-competitive research" was necessary because the auto-makers, as rivals looking to near-term results, could not commit enough funds to such a long-term goal. Moreover, with low gasoline taxes and cheap fuel in the United States, there was no market demand for fuel-efficient engines. Now, at the midpoint of the 10-year effort, the Partnership is proving to be effective, since by 2001 a gas/electric production car with a fuel economy of 80 miles per gallon should be available. The United States Administration has thus been using a mixture of command-and-control and market-based instruments to reduce car emissions (which contribute to global warming), in which the CAFE standards were the stick and the Partnership was the carrot. Regulation and public research have both played a key role: without them, clean-engine technology would have not developed as quickly, since it is a "social good" in which the industry would have under-invested because the rewards were too uncertain.

Source: R. Kuttner, "Don't thank the free market for eco-friendly cars", *Business Week*, 16 February 1998.

2. Education, information and public pressure

38. Environmental education stimulates both producers and consumers to appraise the benefits of a less polluted environment and may facilitate the inclusion of environmental considerations in business practices and consumption patterns. The generation and dissemination of information on the interaction between economic and environmental choices and on their costs can alter the public perception of environmental risks and problems, thus leading to more sustainable approaches. In many developing countries, the very limited availability and poor quality of information on natural endowments, environmental risks and costs accentuate the difficulties of making people accept having to pay for the delivery of environmental services, such as water supply or waste collection. Requiring disclosure or reporting of air and water emissions, waste generation and environmental liabilities serves as an important step in improving environmental behaviour in the industrial community, through informing the public and increasing public accountability of the generators of waste and pollution. A requirement that information be made public can be viewed as a market instrument because it enables consumers to choose, and can be effective in altering corporate behaviour. Well-informed public opinion may be supportive of public decisions which would otherwise be unpopular, such as to increase water prices or to shift public funds from other purposes to environmental improvements. There is a trend for enterprises to disclose to the general public information concerning their environmental policies, objectives and programmes and the corresponding costs and benefits, and to disclose and provide for environmental risks. How an enterprise's environmental performance affects its financial health is often a matter of concern to investors, owners and shareholders, because of the potential impact environmental costs may have on the financial return on their investment in the enterprise. However, customers, suppliers, regulators and the general public may also have an interest. 16/ The call for greater transparency also affects public utilities. According to the recent government green paper on utility regulations, information on British utilities held by regulators should be disclosable unless companies can show that this will cause substantial harm. 17/

39. In response to the setting up of vocal environmental groups, and in order to respond to consumers' expectations in domestic or foreign markets, firms have started including environmental concerns in their business practices with the aim of getting a "green" image and the related market advantages (premium prices, increased market share, increased acceptability as supplier). This trend has led to the well-known phenomena of "eco-labelling" - where products are identified as being more environmentally acceptable than competing products - and environmental management systems, such as ISO 14001, where companies adhere to a set of voluntary rules in order to be able to better control the environmental impact of their activities. The willingness to have a green image is a driver for export-oriented firms and transnational corporations in particular. Global companies often feel they have to address global environmental problems as a sign of their economic and moral leadership. However, public pressure is not always strong and coherent enough to represent a sustainable driver of the demand for environmental goods and services.

3. Economic and financial considerations

40. The demand for environmental services may be unrelated to the regulatory system, and may derive from economic and financial considerations. Firms which have integrated environmental factors in their decisions, by investing in research and development and by adopting advanced production processes and product designs, usually reap economic benefits, due to a more rational use of raw materials and energy and the reduction, avoidance or reutilization of waste. However, in the environmental sector, as in any other sector, companies eventually reach the point of diminishing returns. This means that the additional efforts they make in improving environmental performance represent a cost that does not lead to any saving, unless market rewards for excellent environmental performance are in place. Some leading companies in the OECD countries have already implemented those measures which really pay, so further steps to become "cleaner" will be increasingly expensive. 18/ For other companies, there is still room for environmental improvements which are also economically viable, especially in the area of waste avoidance and reutilization. However, it seems that firms are going to introduce them at their own pace. Evidence from some developing countries, especially in Latin America, shows that firms have implemented those pollution prevention measures which involve little investment, short implementation periods and simple technology, such as water, energy and input savings, and that these practices lead to positive economic returns when first adopted. However, measures which involve more complex technology and greater uncertainty, higher investments and longer lead times have not been applied. Moreover, the adoption of more advanced environmental practices has been concentrated in a limited number of firms, especially large, export-oriented firms and the subsidiaries of transnational corporations. 19/

41. Financial considerations can also be a factor in generating demand for environmental goods and services. Insurance premiums, credit conditions and treatment of liability may be differentiated between companies which can exhibit sound environmental performance and the others. In the United States, the Securities and Exchange Commission now requires that all publicly traded companies listed on the stock exchange quantify their contingent liabilities. This mostly relates to environmental liabilities such as contaminated properties, and the requirement has stimulated demand for analysis and clean-up by environmental services firms.

4. Tax policies

42. According to some, the surest path to sustainable development is through ecological tax reform, whereby the environmental damage dimension is incorporated in taxation policy. In this view, the goal of fiscal policy would be to incorporate the social and environmental costs of any activity or product in its purchase or manufacturing price, allowing the market to effectively reward the most sustainable products. In the current system, pollution is an externality in economic terms, and ongoing pollution, waste generation and resource consumption only serve to continuously reduce the economic value of the natural resource base. An effective two-track environmental policy in the form of compliance-focused regulations and economic instruments, together with effective economic policy reform based on ecological tax reform, might ensure that developed and developing countries

would pursue sustainable development. However, there is a widespread recognition that the implementation of environmental taxes would need to be facilitated by some kind of international cooperation or harmonization, to avoid undermining the international competitiveness of those introducing ecotaxes unilaterally.

43. The above-mentioned drivers, however, can be effective only if certain preconditions are met: there must be, for example, an administrative infrastructure (e.g. a billing company) which allows for the assessment of costs of natural resources and environmental services and the collection of fees, the political willingness and leadership to make it possible to take decisions which may be controversial, and a threshold economic level. Several low-income countries and LDCs are below the economic threshold that would allow them to provide basic environmental services to the population.

Box 3

Privatization in the water sector

Across developed and developing countries, local governments are giving water concessions to private firms. In the Philippines, the city of Manila recently awarded contracts to run the city's water and sewerage services to two private consortia. In 1992 a consortium led by a French firm won a 30-year contract to run water and sewerage services in Buenos Aires; the same company has recently been awarded a 25-year contract to construct and operate a drinking-water treatment plant in the city of Medan, Sumatra (Indonesia). However, some questions remain on the notion of profits being made from public services. On the one hand, the involvement of private companies often produces dramatic improvements in the efficiency of water utilities - which are often bureaucratic, inefficient and corrupt - and provides the capital needed to connect millions of new customers. On the other hand, private entities operate on the basis of market rules, and it is questionable whether those rules are always consistent with the public interest. It can be argued that all the profits generated by water supply, or most of them, should be invested in water infrastructure. Similarly, conflicting views are found regarding water prices. With few exceptions, consumers worldwide are charged less for the water they consume than it costs to provide it. A survey of water projects financed by the World Bank showed that the average price charged for water covered only a third of the cost of supplying it. Usually, this shortfall is made up by government subsidies, or by allowing the infrastructure to deteriorate. According to some, artificially low water prices cause problems, particularly in developing countries. Consumers are given little incentive to conserve water, utilities are reluctant to connect new customers because prices are too low to allow them to recoup their investment and, ultimately, the subsidies meant to make sure that water is a basic entitlement for everybody end up penalizing the poor. According to others, a rise in water prices would have negative effects on basic cleaning habits, such as hand-washing, and would thus increase the risk of spreading diseases; in this view government subsidies are necessary policy tools. However, Governments which subsidize water prices face high costs that they might not be in a position to afford in the long run, especially if they are trying to improve the infrastructure at the same time. The question of how additional resources to satisfy basic environmental needs can be mobilized remains.

B. GATS commitments

44. According to GATS, and in accordance with the United Nations Central Product Classification (CPC), environmental services include: (a) sewage services; (b) refuse disposal services; (c) sanitation and similar services; and (d) other (cleaning services of exhaust gases, noise abatement services, nature and landscape protection services, and other environmental services n.e.c). Therefore, most non-traditional environmental services are excluded from this classification.

45. The favoured modes of supply for environmental services are commercial presence and the presence of natural persons. However, information technology now makes it possible to use the cross-border mode of supply for the partial or full delivery of some services (mainly support services), although this would not be feasible for the majority of traditional labour-intensive environmental services, such as waste management, sewage treatment and water utilities. There seems to be limited scope for consumption abroad in this sector, with the exception of some education related services and some services linked to the transport and handling of waste.

46. Only a third of member countries of the World Trade Organization (WTO) have made commitments on environmental services in the context of GATS, but they include those that are the major players in the international markets (see table 1). The majority of commitments have been made by developed and East European countries (20). Only two commitments are scheduled by countries from the Asian region and two from Latin America. The remaining commitments have been made by countries from Africa. Notably, no limitations on foreign investment have been included in the specific commitments, although limitations included in the horizontal commitments, which reflect economy-wide legislation and affect all services sectors, might restrain foreign investment in this sector.

47. Further commitments under GATS relating to commercial presence and the presence of natural persons could stimulate trade in environmental services and encourage foreign investment in developing countries. The impact on trade of such commitments, moreover, might be enhanced by liberalization in other service sectors. There is a significant component of specialized services in virtually every environmental project, from design to engineered solutions. Few environmental solutions are standardized and off-the-shelf; hence the widespread and often ongoing involvement of consulting, engineering and management services. Liberalization efforts might therefore be extended to other service sectors which touch on the environmental area, such as construction services, engineering services, research and development, legal services, accounting, auditing and bookkeeping services, management consulting services.

48. An additional peculiarity of some environmental services, especially those related to utilities, is that they involve considerable investment, which can only be recouped in the long run. Thus, ownership and control become a significant consideration, and liberalization in this area may be worth considering as far as the environmental sector is concerned.

Table 1

Commitments on environmental services made under GATS a/

Environmental services - overall 37 country commitments
(A) Sewage services - 29 commitments
(B) Refuse disposal services - 30 commitments
(C) Sanitation and similar services - 31 commitments
(D) Other services - 28 commitments

Modes of supply of service	Fully open market access				No restrictions to national treatment				Barriers to trade if free trade is not granted
	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	
Cross-border	8 (28%)	8 (27%)	10 (32%)	12 (43%)	10 (35%)	10 (33%)	11 (36%)	11 (39%)	Technical unfeasibility
Consumption abroad	25 (86%)	26 (87%)	26 (84%)	24 (86%)	26 (90%)	28 (93%)	27 (87%)	25 (89%)	None
Commercial presence	27 (93%)	26 (87%)	31 (100%)	25 (89%)	29 (100%)	30 (100%)	31 (100%)	27 (96%)	Licences, authorization, limited number of licences issued; domicile needed; economic needs test; monopoly; foreign equity limited to 49%
Movement of suppliers, as natural persons	1 (3%)	1 (3%)	2 (7%)	1 (4%)	3 (10%)	6 (20%)	7 (23%)	8 (29%)	Licence; operate through local representative

a/ Table 1 indicates the number of countries having made commitments in each subsector of the environmental servics on market access (first set of columns) and on national treatment (second set of columns), according to the four modes of supply of GATS.

III. BUSINESS OPPORTUNITIES FOR DEVELOPING COUNTRIES AND ACTUAL OR POTENTIAL LIMITATIONS

A. Business opportunities

49. Technical expertise, price, quality and reliability of services are the most crucial competitive factors in the environmental industry, but other factors, such as geographical or cultural proximity or the capacity to offer a multidisciplinary package, may also contribute to a company's competitiveness. Most of the developing countries' emerging demand for environmental goods and services is at present met by firms from developed countries, although domestic firms or firms from other developing countries may take over this task in the medium term. Strategies to create or expand business opportunities may include: (i) offering an integrated package of goods and services; (ii) offering specialized services; (iii) targeting regional markets; and (iv) establishing links with foreign companies.

50. Environmental problems are often specific to given regions. Therefore solutions should be adapted to the local situation. Firms from developing countries may be in a better position than firms from industrialized countries to address environmental problems peculiar to the developing regions. Moreover, they may be able to offer a range of products and services which compete with those offered by firms from developed countries in terms of cost and simplicity and which are perceived as more appropriate to the needs of the developing country.

51. Countries in different regions but with similar environmental problems could also acquire technologies and services from companies in developing countries, thereby generating export potential. Examples of services that could be offered include: the management of rainforests; environmental management in resource-extraction industries like mining, oil and gas or forestry products; the preservation of biologically rich ecosystems; and the reduction of air pollution in the world's largest cities. For example, Brazil, after several failures in addressing deforestation in the Amazon, seems to have identified some policy strategies - such as upholding the rule of law, securing property rights, weeding out corruption and reducing subsidies - that may help to reduce the rate of deforestation and promote economic growth. Public authorities and private firms which have been involved in the process may make their expertise available to countries in Asia or Africa which are also fighting deforestation.

52. The ability to offer an integrated package of goods and services or to provide multidisciplinary services makes a company more appealing in the market. Transnational waste companies which can provide integrated services are present in both developing and developed countries. The interest in contracting those companies lies in their ability to take care of waste collection, transport, disposal, recycling, composting, waste-to-energy generation, and so on. Municipalities can be serviced by a single such company performing a series of interrelated activities. In developing countries, some firms are pursuing this business strategy. In Malaysia, a private company whose main business is to operate waste-water plants privatized by the Government is following the example of the British and French water companies and is providing integrated water services domestically and to other countries in the Asia-Pacific region. Another Malaysian company, which operates engineered water-treatment systems, has boosted its capabilities by starting a manufacturing facility. This has given the firm full capacity to not only design but also manufacture its combination of licensed and proprietary water-treatment systems. The company is expanding its activities in Indonesia and Thailand through acquisition and is moving to the very specialized market of ultra-pure water.

53. However, the provision of integrated packages of goods and services is beyond the capacity of many firms in developing countries. Developing such a capacity may require forging partnerships with other firms which offer complementary knowledge and technologies. In particular, by establishing links with companies from industrialized countries, firms from developing countries may be able to acquire state-of-the-art technologies, reach markets that otherwise would be difficult to access, and become part of an international network. For example, an Indonesian group, in partnership with a French water multinational, has won the concession for water management in one section of Jakarta; a California-based integrated environmental firm and its partner from the Republic of Korea have set up a joint venture geared

towards treating toxic and radioactive waste and contaminated areas in the Republic of Korea, and plan to offer their services to other emerging markets in Asia. Partnerships between local companies in developing countries and foreign or transnational firms can also be beneficial for the developed partners, since they make it easier for the latter to start up activities in emerging markets, where environmental and business conditions can be quite different from those in developed countries. Partnerships seem to have contributed dramatically to enhancing technical capabilities in developing countries.

Box 4

The case of Brazil

Brazil was the first country in Latin America to implement a coherent package of environmental legislation. In addition, individual states developed legislation at state level, the most advanced probably being the State of São Paulo, where a public company, CETESB (Companhia de Tecnologia de Saneamento Ambiental), developed the capacity to absorb, adapt and modify environmentally sound technologies imported from the developed countries. CETESB runs training activities aimed at upgrading the technical skills of its personnel, and it is responsible for approving large construction projects, after assessing their environmental impact. The company runs a number of projects of great importance to the country and the region. With the cooperation of the United States Environmental Protection Agency, and using funds made available by the World Bank, CETESB has started a pilot project with a group of private firms in the State of São Paulo aimed at replacing end-of-pipe technology with cleaner technology. It has undertaken initiatives for importing and adapting to local conditions technology for cleaning up industrial sites, for the management of hydric resources, and for the incineration of industrial waste. It has also implemented a project to reduce air pollution from mobile sources in São Paulo. The results of these projects are relevant to other countries in the region which share the same problems, i.e. air contamination, especially in large cities, dependence on end-of-pipe technology and a limited capacity to deal with highly sophisticated technology. CETESB has been providing consultancy services to other Latin American countries (Argentina, Uruguay, Paraguay and Mexico), has opened its training courses to technicians from foreign countries (mainly countries of the region and Portuguese-speaking African countries) and is thinking about developing a marketing strategy to sell (at market price) its services to foreign countries. The income generated by these activities would represent a new source of financing for environmental initiatives in the State of São Paulo. Some private firms are also providing environmental services abroad. The technologies and services provided by these companies may be more appealing to neighbouring countries than those supplied by firms from developed countries because of their knowledge of environmental problems specific to the region, cultural affinities, a similar language, and greater understanding of the way in which business is carried out in the region. If Brazilian legislation becomes the basis for the development of environmental legislation in other countries of the Southern Common Market, export opportunities for both State-owned and private companies will dramatically increase.

B. Actual or potential limitations

54. Limitations to business opportunities can be identified as relating to: (i) demand conditions; (ii) supply-side considerations; (iii) policy; and (iv) legislation.

55. With regard to demand conditions, the following obstacles can be listed: (i) relative stagnation of the demand for environmental goods and services in the OECD countries and insufficient financial resources to pay for environmental goods and services in developing countries; (ii) uncertainty related to payment: for firms expanding their activities in developing countries, the main risk is foreign exchange, since payments are made in local currency, and partial payment for services provided is also a risk; (iii) a changing political situation: it may happen that a newly established Government is not able to honour the terms of the contract with a private company; (iv) corruption: the public market can be particularly opaque and therefore difficult to penetrate for foreign firms which do not know the rules of the game; and (v) lack of a reliable legal system to guarantee compliance with the commitments undertaken by the parties.

56. With regard to supply-side considerations, the following can be included: (i) difficulties faced by small and medium-sized companies: the environmental industry is heavily represented by small and medium-sized companies which have little inclination to export, especially when faced with large companies that are well established in the international market; and (ii) lack of skilled personnel and lack of financial resources for training, especially in developing countries.

57. With regard to policy, the following restraints can be noted: (i) preference for local firms and public procurement rules are making it difficult or even impossible in certain cases for foreign firms to deliver environmental goods and services; and (ii) lack of government support in terms of business development, finance and tied aid.

58. Finally, with regard to legislation, limitations on the movement of natural persons and on a foreign commercial presence may hinder the delivery of environmental services abroad. For instance, there may be time restrictions on the stay of experts in a foreign country, national legislation may impose limitations on imported labour (especially at the middle-management level) or a firm may face limitations related to facility ownership or company control. The regulatory process generally requires firms in the environmental services industry to obtain numerous permits to conduct various aspects of their operations, any of which may be subject to revocation, modification or denial. The documentation, testing procedures and information-gathering requirements which may be requested for such permits can impair foreign companies' ability to obtain, retain or renew applicable permits in a timely fashion. Legislation may also create strict liability (especially for operations related to the transportation, treatment and disposal of waste), which may represent a barrier for small companies or for companies with limited experience in this field. The market for environmental liability insurance is restricted, with only a few insurance companies currently offering limited coverage on restrictive terms and at high premiums.

59. However, new practices are making it possible to overcome some of the limitations included in national legislation. In particular, the use of information technology may reduce the need to spend long periods abroad to deliver a service, since most of the preparatory work (e.g. analysis of relevant legislation of the host country) can be done in the exporting country, making it easier to cope with limitations on the movement of natural persons. Also, new business techniques apply in the environmental sector; the "build-operate-transfer (BOT)" procedure is widely used in water utilities and is also becoming common in the waste segment. Under this procedure, a private firm and a public authority enter into a contract for the design, construction, operation and maintenance of a facility. Once the facility becomes operational, the public authority starts reimbursing the private firm for the costs it has incurred. After refunding capital expenditure, the public entity acquires the ownership of the facility, while it continues to pay the private firm for operating it. In this case the role of the private entity changes over time (i.e. from owner to manager), with a parallel modification of its legal obligations and of the limitations it may face.

IV. ENHANCING DOMESTIC CAPACITY

60. A number of conditions must be satisfied if the environmental services sector is to be strengthened. The formulation of appropriate environmental legislation and the setting up of environmental authorities to enforce it are the first steps in addressing environmental problems. The way in which environmental legislation is developed is also crucial: if all the relevant stakeholders, such as the State, enterprises, non-governmental organizations and social groups, are involved, there is more likely to be support for otherwise unpopular decisions. The enforcement of environmental legislation often involves public participation. In Brazil, public hearings on environmental impact assessments initially involved only the parties directly concerned. Subsequently, environmental groups and local organizations began to join the process, making its results more widely acceptable and increasing the democratic participation in environmental policy-making. One of the reasons for the success of the Healthy Cities initiative of the World Health Organization is the representational and participatory element. The analysis of the health and environmental needs of a city and the priority-setting process require that the views of the communities concerned should be heard, and thus their participation in the implementation process is needed. Some healthy cities have developed what is termed "participative budgeting", which allows citizens a greater involvement in setting priorities for municipal environmental investments and a greater openness about how revenues are acquired and spent. 20/ Choices which imply costs for citizens (e.g. water and waste fees) may become acceptable through the kind of process described.

61. The availability of ESTs and related know-how are one of the keys to environmental sustainability in developing countries. The constraints that firms face in accessing and utilizing ESTs originate from both the supply and demand sides. Among the supply-side obstacles are the protection, or lack of appropriate protection, of intellectual property, 21/ cost factors, lack of relevant information to make the right choice, the fact that some ESTs are not yet marketed or marketable, time-consuming licensing procedures which add to the cost of technology, and inadequate policy and incentive measures in technology-producing countries to promote the diffusion of ESTs. On the demand side, some of the major impediments include financial constraints, lack of local capacity, lack of the skills required to acquire, adapt and

assimilate technologies, lack of awareness and relevant information on available ESTs, and the absence of regulations, policies, incentives and the instruments of enforcement to advance the utilization of ESTs.

62. The issue of affordability is often a major demand constraint, particularly where the economic conditions of the country to which the technology is to be transferred are very different from those of the industrialized countries where the technology has been developed and applied. For example, the size of the market and the less sophisticated distribution systems and marketing channels may mean that production costs per unit will be higher or that a high volume of production cannot be attained. The technology as applied in industrialized countries may well need to be adapted to these different conditions, a process which will also incur additional costs.

63. Overcoming the initial barriers to the introduction of a new technology may require public-sector funding, as deliberate efforts are required to create an economic and policy environment appropriate for the transfer and diffusion of ESTs and to sensitize potential users to the advantages of acquiring, adopting and assimilating ESTs. 22/ Firms which have innovative and high-quality management are better placed to play a dynamic role in technology absorption. The availability of resources for personnel training is also crucial, since the environmental industry in developed countries represents one of the largest concentrations of technical, engineering, manufacturing and management skills in the world today, but many nations in the developing world lack the technology and educational resources to match this in the short term.

64. The experience of Brazil confirms that public authorities can greatly contribute to capacity-building. Increased domestic capacities characterize the success stories. In the case described, the local government played a crucial role in providing the appropriate legal framework; it enhanced domestic capacity to acquire, assimilate and adapt technologies, guaranteed that the commercial interests of foreign firms holding intellectual property rights were protected, raised funds from international agencies and developed countries for personnel training, disseminated information to private firms on the advantages of using ESTs, and made sure that environmental policy decisions were the result of a participative process.

65. As mentioned, the main thrust of strengthening capacities in developing countries in the environmental services sector is to help them in addressing, and eventually solving, their environmental problems. This should be part of a global effort to achieve sustainable development. Moreover, strengthening capacities in the environmental services sector may lead to additional positive outcomes. For instance, developing countries could aim to make the export of environmental services a profitable activity, since they would be in a much better position to meet environmental requirements in the importing markets and they could better satisfy consumers' expectations about the environmental virtues of products and related manufacturing processes. They would become more appealing destinations for foreign direct investments, have easier access to capital, and strengthen other domestic sectors. The evidence also shows that countries which have made efforts to improve sanitation and waste collection and to limit air and water pollution have been rewarded by an increase in tourism.

Notes

1/ OECD in cooperation with Eurostat, *Environment Industry Manual, Proposed Guidelines for the Collection and the Analysis of Data on the Environment Industry*, forthcoming.

2/ These estimates include sales of equipment, services and natural resources.

3/ Environmental Business International, Inc., San Diego, CA, USA, "The global environmental market and United States environmental industry competitiveness", executive summary of a research project and report funded by a grant from the United States Environmental Protection Agency entitled *The Global Environmental Industry: a Market and Need Assessment, 1995.*

4/ Source: Environmental Business International, Inc., San Diego, CA, USA.

5/ Source: United States Department of Commerce.

6/ D.R. Berg and G. Ferrier, "The US environmental industry", in *Meeting the Challenge: US Industry Faces the 21st Century*, United States Department of Commerce, Technology Administration, Office of Technology Policy, September 1997.

7/ The analysis of the regional markets is based on Environmental Business International, Inc. *op. cit.*

8/ In its recently developed classification, the OECD includes services in the three main categories into which the environmental industry has been divided: "Pollution management"; "Cleaner technology and product"; and "Resources management". However, the following detailed list of environmental services is included in the "Pollution management" category: air pollution control; waste-water management; solid waste management; remediation and clean-up of soil, surface and ground water; noise and vibration abatement; environmental research and development; environmental contracting and engineering; analytical services, data collection, analysis and assessment; education, training and information. See OECD in Cooperation with Eurostat, *op. cit.* A private-sector classification divides environmental services into the following categories: analytical services; waste-water treatment works, solid waste management, hazardous waste management, remediation, consulting and engineering. See Environmental Business International, Inc., *op. cit.* In the absence of a global statistical and methodological system for data collection in this specific industry, the latter classification has been widely used.

9/ The description of these segments and related trends is based on interviews with companies operating in the environmental market.

10/ "Dirt poor: a survey of development and the environment", *The Economist*, 21 March 1998.

11/ For example, legislation related to the Superfund has not been renewed.

12/ OECD, *The OECD Environmental Industry: Situation, Prospects and Government Policies*, Paris, OECD, GD(92)1, 1992.

13/ According to the WTO Agreement on Subsidies and Countervailing Measures, subsidies which provide assistance to firms to promote adaptation of existing facilities to new environmental requirements imposed by law and/or regulations which result in greater constraints and financial burden on firms, are non-actionable, if they are granted as a one-time non-recurring measure and are available to all potentially interested firms. A review of non-actionable subsidies is scheduled to start in June 1999.

14/ For example, Poland uses air-pollution taxes, China uses waste-water discharge fees, the Netherlands, Denmark and the Republic of Korea use packaging deposit/refund systems, Indonesia and Brazil use watershed charges, Malaysia and Guatemala use carbon offsets, China and Germany use over-compliance credits, and the United States, Germany, the Netherlands, the United Kingdom, Australia, Canada and Thailand use tradeable permits. See D.R. Berg and G. Ferrier, *op. cit.*

15/ J.P. Barde, "Economic instruments for environmental protection: experience in OECD countries", in *Applying Market-based Instruments to Environmental Policies in China and OECD Countries*, OECD, 1997.

16/ Working Group of Experts on International Standards of Accounting and Reporting (ISAR), "Position paper: accounting and financial reporting for environmental costs and liabilities", UNCTAD, TD/B/COM.2/ISA/2/Rev.2, 13 February 1998.

17/ "Utility regulation: going backwards", *The Economist*, 28 March 1998.

18/ Monsanto, a large American chemical company, admitted that the costs of doubling investment in environmental protection in the late 1980s absorbed most of the improvement in profit margins the company may otherwise have enjoyed in that period. Texaco planned in 1995 to invest US$ 1.5 billion a year for five years on environmental compliance and emission reduction. The total investment will be three times the book value of the company and twice its asset base. Yet this project will provide little revenue. Even though these numbers may turn out to be exaggerated, they give an indication that pollution prevention is not free. See: F. Cairncross, *Green, Inc.*, London, Earthscan, 1995.

19/ D. Chudnovsky, A. López and V. Freylejer, *The Diffusion of Pollution Prevention Measures in LDCs: Environmental Management in Argentine Industry*, Centro de Investigaciones para la Transformación (CENIT), January 1998.

20/ *Creating Healthy Cities in the 21st Century*, background paper prepared by the WHO for the United Nations Conference on Human Settlement, Habitat II, Istanbul, 3-14 June 1996, WHO/EOS/97.9.

21/ On the one hand, stronger and broader intellectual property rights (as a result of the implementation of the TRIPS Agreement) would enhance the bargaining position of technology holders vis-à-vis potential licensees. On the other hand, the implementation of stronger protection of intellectual

property rights in developing countries may be a necessary condition for the transfer of technology. In practice, however, the environmental industry has not identified intellectual property protection as a high-ranking problem.

22/ UNCTAD, in cooperation with UNEP and DESA, "The role of publicly funded research and publicly owned technologies in the transfer and diffusion of environmentally sound technologies", background document for the International Expert Meeting on the role of publicly funded research and publicly owned technologies in the transfer and diffusion of environmentally sound technologies, Kyongju, Republic of Korea, 4-6 February 1998.